Remarks

Claims 1-26 are pending in the application. All claims stand rejected. By this paper, claims 1, 2, 6-10, 12, 18, 19, and 21 have been amended. New claims 27-29 have been added to provide claim coverage commensurate with the scope of the invention.

Claims 1-2, 5-10, 12, and 14-17 were rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al. ("Ito"). Claims 3-4, 11 and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ito. Claims 18-26 were rejected under 35 U.S.C. 103(a) as being unpatentable over Ito in view of Humpleman et al. ("Humpleman"). These rejections are respectfully traversed.

Claim 1 has been amended to more particularly point out and distinctly claim the subject matter of the invention. As amended, claim 1 recites a method comprising:

> identifying a <u>bitrate histogram</u> associated with multimedia content to be transmitted to a multimedia node; and
>
> changing a <u>bandwidth allocation</u> for the multimedia node <u>in anticipation of a future bitrate spike</u> indicated in the bitrate histogram.

These claimed features allow a media server to <u>proactively</u> adjust the bandwidth allocated to a multimedia node <u>in anticipation of a future bitrate spike</u> to ensure, among other things, that multimedia content is reproduced at the multimedia node without interruption/jitter. By identifying a <u>bitrate histogram</u> for the multimedia content, the server may take steps to prevent a buffer underrun prior to encountering the spike, such as providing additional bandwidth to fill a buffer at the multimedia node.

Ito does not disclose bitrate histograms. Rather, Ito's video data index includes instructions for how to extract certain frames of video data to achieve one of several different bitrates depending on the network load. In other words, if the network load won't permit the transmission full 1.5 Mbps video data, Ito's server degrades the video quality, as instructed in the video data index, by selecting some frames and dropping others.

For example, as shown in FIG. 3, in order to reduce the bitrate to 768 Kbps, the system transmits all of the "I" frames, but only three "P" frames for each GOP (group of pictures), which degrades the video quality somewhat, but is preferable to a buffer underrun. Similarly, to achieve 128 Kbps, the system transmits only one "I" frame for every 5 GOPs, substantially degrading the video quality.

As explained by Ito, the "video data index 13 indicates the [frame] types [*i.e.*, I or P], numbers [*i.e.*, three "P" frames per GOP], and time axis of data [*i.e.*, the time index of the frames] which are to be selected from the compressed original video data by the video data assembler 14." Col. 6, lines 9-12. Ito is concerned with modifying the video data, and the video data index only tells how the video data is to be modified. It is not a histogram of bitrate requirements for the video data.

This is clearly set forth in the following example described by Ito:

> For example, when video data are transferred at a transfer bit rate of 1.5 Mbps, 64 Kbyte of data are delivered every 340 msec. If there is a margin of the load imposed on the network, the system can maintain the transfer bit rate of 1.5 Mbps for these delivery parameters. However, the video server cannot maintain the transfer bit rate if the load is increased. In order to resolve this problem, the video server starts to measure a time T_r required for transfer of data at constant intervals T_1 so as to determine the load imposed on the network just after transfers of video data are started. Then, the video server, in steps F43 and 45, compares a measured value T_r to a reference value T_{d1},

> which is the maximum time required for transfer of data that cannot be exceeded in order to maintain the current transfer bit rate.
>
> If the measured value T_r exceeds the reference value T_{d1}, the video data assembler 14, in step F44, **extracts** all the I pictures and P pictures defined as video data to be transferred at the second transfer bit rate from the video data 12 so as to set the transfer bit rate to the second bit rate setting, **modifies** the header information in such a manner that the information shows that video data to be transferred are constructed of all the I and P pictures, and **reassembles** the extracted data to create video data to be transferred **at the second transfer bit rate** which is **reduced** from the original transfer bit rate by one level. The video data delivery unit 15 delivers the video data created at the new transfer bit rate while creating the video data rather than deliver all video data after they are created from the video data 12.

Col. 6, lines 29-56 (emphasis added).

Nothing in FIG. 3 or the accompanying disclosure suggests a histogram of bitrate data. Indeed, Ito does not require one. Ito merely reduces the bitrate when the current network load makes it impossible to transfer the video data at the full bitrate. Ito does not anticipate future bandwidth spikes, as in the claimed invention. Furthermore, Ito does not change bandwidth allocations. Rather, Ito keeps the same bandwidth allocations and modifies the underlying video data by removing frames.

By contrast, a system in accordance with the present invention relies on a bitrate histogram to make proactive changes to bandwidth allocations, without modifying the underlying video data. A system in accordance with the present invention does not degrade the video data as in Ito, *e.g.*, only passing three "P" frames per GOP.

By anticipating upcoming bandwidth spikes using the bandwidth histogram, a system in accordance with the present invention may take proactive measures to

increase bandwidth to a particular multimedia node to ensure that the node's buffer is full when the spike arrives. Ito has no such teaching or suggestion.

A system in accordance with the present invention does not require a "network load sensor 17" as in Ito. According to the claimed invention, bandwidth changes are initiated <u>in anticipation</u> of the spike, well before a network load sensor may detect a problem. Ito's reliance on a network load sensor is a significant deficiency of his system, and actually teaches away from the claimed bitrate histogram.

The addition of Humpleman does not cure the deficiencies of Ito. Humpleman merely discloses a home network system that provides browser-based command and control. Nothing in Humpleman suggests the claimed bitrate histogram. Furthermore, nothing in Humpleman suggests modifying a bandwidth allocation in anticipation of a bitrate spike indicated within a bitrate histogram

Accordingly, the applicant respectfully submits that claim 1 is patentably distinct over the cited references. Claims 2-7 depend directly or indirectly from claim 1 and are thus believed to be patentably distinct for at least the same reasons.

As amended, claim 8 recites a method for providing efficient bandwidth allocation on a bandwidth-limited network comprising:

> receiving a request for multimedia content from a first multimedia node;
>
> allocating a first amount of bandwidth to supply said multimedia content to said multimedia node; and
>
> dynamically adjusting said first amount of bandwidth based on a <u>template of bitrate data as a function of time</u> indicating changes in bitrate requirements of said multimedia content<u>, wherein said adjusting is done prior to the occurrence of said changes</u>.

As explained above, Ito does not disclose or suggest a template of bitrate data "as a function of time" (*e.g.*, a histogram). In addition, because of Ito's reliance on a network load sensor rather than a bitrate histogram, he does not make bandwidth changes prior to the occurrence of the changes in bitrate (*i.e.*, the bitrate spike). Indeed, Ito does not even manipulate bandwidth, as discussed above in connection with claim 1, but simply reassembles the video data, leaving out "P" and sometimes "I" frames.

Claim 12 requires the further step of "dynamically adjusting said first amount of bandwidth based on a histogram of bitrate data indicating changes in bitrate requirements of multimedia content requested by a second multimedia node." Ito does not disclose changing a bandwidth allocation of a first multimedia node based on a bitrate histogram of a second multimedia node. Even if Ito's video data index could be construed to be a template of bitrate data as a function of tine, which it cannot, Ito could only make decisions concerning modifying the video data based on the index of multimedia content requested by the first multimedia node.

Accordingly, the applicant respectfully submits that claims 8 and 12 are patentably distinct over the cited references. Claims 9-17 depend directly or indirectly from claim 8 and are thus believed to be patentably distinct for at least the same reasons. Claims 18-26 include similar limitations to those found in claims 8-17, but are written in system format. Thus, claims 18-26 are likewise believed to be patentably distinct.

New claim 27 recites a method comprising:

> identifying a bitrate histogram associated with multimedia content to be transmitted to a multimedia node; and

delaying a start time for the multimedia content on the multimedia node for a particular period in anticipation of a future bitrate spike indicated in the bitrate histogram.

Neither reference, alone or in combination, discloses delaying a start time for multimedia content in anticipation of a future bitrate spike indicated in a bitrate histogram. Accordingly, the applicant respectfully submits that claim 27 is patentably distinct.

New claim 29 recites a method for providing efficient bandwidth allocation on a bandwidth-limited network comprising:

receiving a request for a first set of multimedia content from a first multimedia node;

identifying a first bitrate histogram associated with the first set of multimedia content;

allocating a particular amount of bandwidth to supply the first set of multimedia content to the first multimedia node based on the first bitrate histogram;

identifying a second bitrate histogram associated with a second set of multimedia content to be transmitted to a second multimedia node, the second bitrate histogram indicating a future spike in bandwidth requirements for the second set of multimedia content; and

throttling back the bandwidth allocated to the first set of multimedia content prior to encountering the bandwidth spike associated with the second set of multimedia content.

Neither reference, alone or in combination, discloses using two bitrate histograms to make bandwidth allocations. Neither reference, alone or in combination, discloses throttling back the bandwidth allocated to a first set of multimedia content prior to encountering a bandwidth spike associated with a second

set of multimedia content. Accordingly, the applicant respectfully submits that claim 29 is patentably distinct.

In view of the foregoing, the applicant respectfully submits that claims 1-26, as amended, as well as new claims 27-29, are patentably distinct over the cited references, alone or in combination. Reconsideration and early allowance of all pending claims herein is respectfully requested.

Respectfully submitted,

Digeo, Inc.

By

Kory D. Christensen
Registration No. 43,548

STOEL RIVES LLP
One Utah Center Suite 1100
201 S Main Street
Salt Lake City, UT 84111-4904
Telephone: (801) 328-3131
Facsimile: (801) 578-6999